Cole-Parmer® QPCR-500

Real Time PCR System

Cole-Parmer®

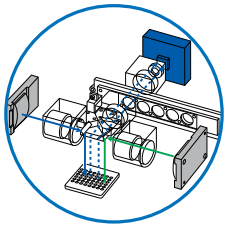
Introducing the Cole-Parmer® QPCR-500 Real Time PCR System, previously know as the ECO-48

The Cole-Parmer QPCR-500 Series

The Cole-Parmer QPCR-500 real time PCR system is a high specification, economically priced real time thermal cycler that accommodates a unique 48-well polypropylene PCR plate utilising the same geometry as standard 384-well plates, but only 1/8 of the size.

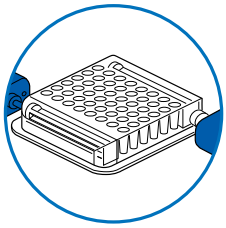
This enables users to dramatically reduce the qPCR reagent volumes compared to traditional 96-well instruments, saving users precious sample, whilst still producing a strong fluorescence signal. Minimizing the plate size also significantly improves thermal uniformity. A minimum volume of 5µl is validated, resulting in a more efficient use of expensive and ‘hard to acquire‘ template DNA samples.

Intuitive icons lead researchers through setup, run and analysis quickly and easily



Sensitive optical system delivers precise detection for a range of fluorophores

Convenient 48-well format meets the throughput needs of most researchers



Unique thermal system provides unmatched temperature control for the most accurate results

Cole-Parmer QPCR-500 Key Features

- MIQE compliant
- HRM functionality is provided as standard and can discriminate class IV SNP 99.9% of the time
- The QPCR-500 can utilise four colours for easy multiplexing
- Industry leading ±0.1ºC temperature uniformity (recorded at 95ºC no settle time)
- Fast cycling enables several experiments per day, all at an economical price
- Fastest block-based real-time PCR system with the ability to run 40 cycles in 20 minutes (or less when optimised)
- The QPCR-500 is an open platform that can utilise any chemistry, dye or PCR reagent
- Calibrated for SYBR®, FAM™, HEX™, VIC™, ROX™ and Cy®5 fluorescent dyes
- Easy to use software, streamlined for novices and experts

Cole-Parmer QPCR-500

The QPCR-500 workflow is based on three simple steps:

1. Load samples into the 48-well plate using the backlit dock and place the plate into the QPCR-500.
2. Run experiment.
3. The QPCR-500 software provides instrument control, data collection, and data analysis. The most common qPCR parameters are automatically in place. These can be easily changed to meet specific experimental requirements.

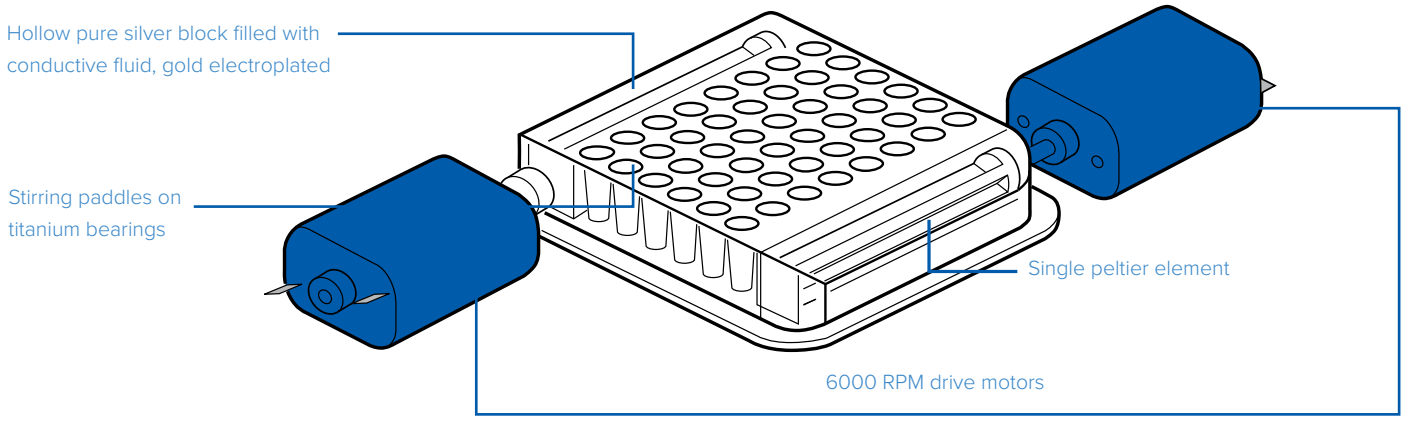
Cole-Parmer QPCR-500 thermal technology

The QPCR-500 specificity and efficiency relies on precise temperature control during the denaturation and annealing steps. For the highest accuracy, temperature must remain uniform across the entire heat block, ensuring that all samples are processed equally. The unique thermal block design of QPCR-500 achieves this with a unique heating and cooling system that provides accurate ±0.1°C temperature control and quickly cycles from one temperature to the next.

To achieve true temperature control the QPCR-500 thermal system consists of a precisely electroformed 48-well hollow silver block containing conductive fluid. The block is heated and cooled by a single Peltier device, with an agitator assembly consisting of two paddles driven by electromagnetic motors. During PCR cycling, the paddles move rapidly, circulating the fluid across the 48 wells, allowing the block to achieve high ramp rates, thus reducing the overall experiment time.

This unique design delivers industry leading thermal stability of ±0.1°C virtually eliminating thermal non-uniformity and preventing edge effect. The result is higher qPCR performance, tighter Cq, greater PCR efficiency, higher R^2 and the ability to perform demanding HRM applications.

Fast, uniform temperature control is important because accurate dwell temperatures ensure primers bind most efficiently and polymerase enzymes work optimally, generating the maximum yield of target DNA. The hermetically sealed hollow block contains a conductive fluid and two opposing agitators driven by electromagnetic motors. During PCR cycling, these agitators rapidly circulate fluid throughout the hollow block, transferring heat from the peltier quickly and evenly.



Optical Technology

The QPCR-500 Real Time PCR system contains an advanced high-performance optical system that delivers precise and sensitive fluorescence detection, facilitating all 4 colour multiplex applications.

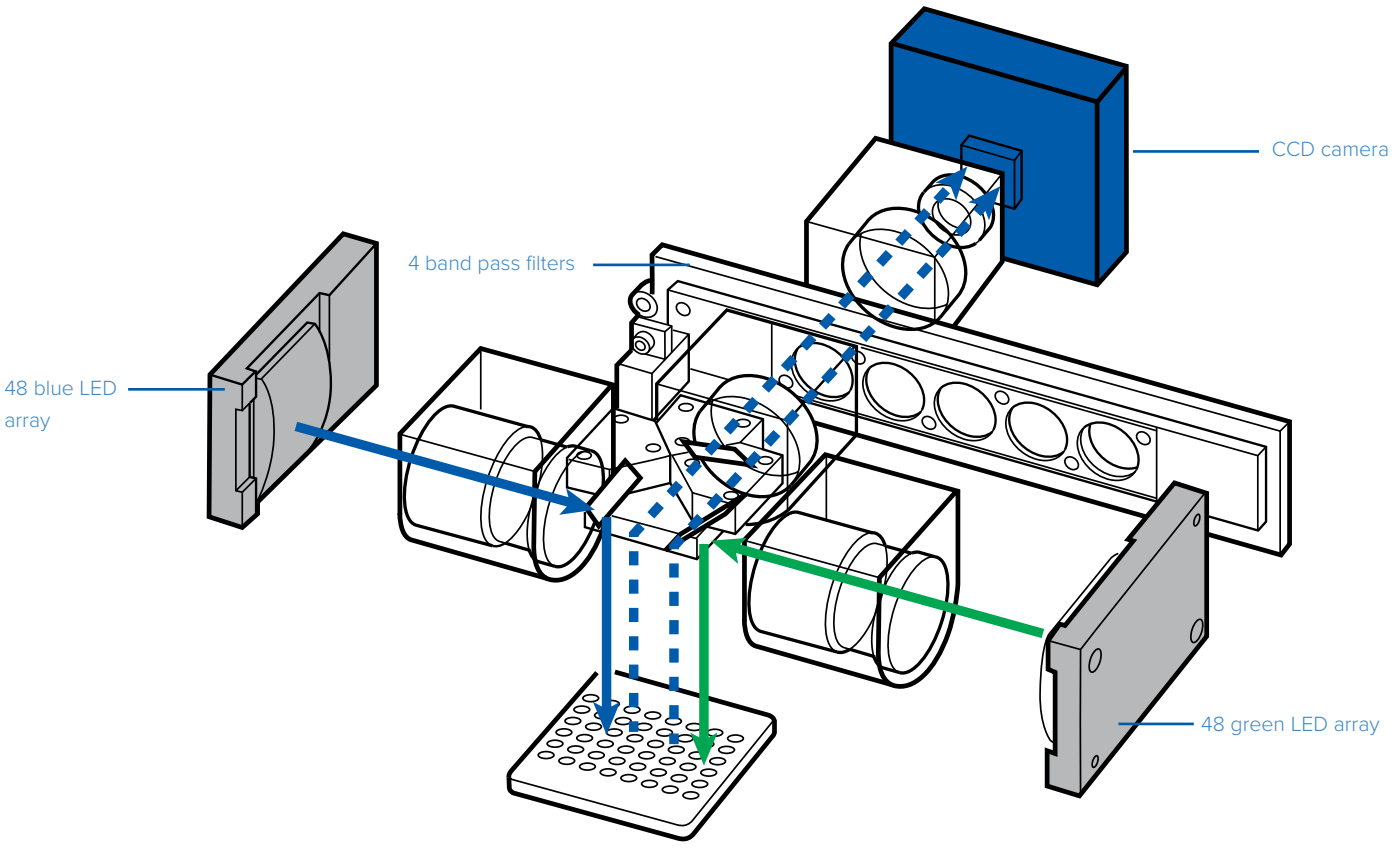
The system is provided factory-calibrated for use with SYBR®, FAM™, HEX™, VIC™, ROX™, Cy®5 and can also be used with any qPCR fluorophores overlapping with these calibrated dyes. For excitation, two panels of 48 fixed LEDs provide excitation energy of distinct spectra, enabling broad range excitation. Each of the 48 LEDs illuminates a specific well location, eliminating the optical distortion created by most stationary optical systems.

HRM analysis protocols are supported by continuous data acquisition during the melt for increased data collection and reduced run times, HRM of a full plate is less than 10 minutes. The user can change the plate setup and perform data analysis after the run is complete.

Adaptive LED Control (ALC)

ALC normalises variation in fluorescence across all wells at each cycle of a run and provides specific tuning for each LED following each PCR cycle.

- Speeds up data collection because only 1 image is required to cover the full sample
- Expands the linear range of detection by reducing LED exposure to high emission wells and preventing premature detector saturation
- LED adjustment following each amplification allows QPCR-500 to reduce exposure time as signal intensity increases, maximising the linear range of emission detection
- Minimise optical artefacts by keeping each well brightness similar to the CCD. Reducing the influence of a highly fluorescing sample on adjacent wells and avoids ‘blooming’, no artificats from adjacent wells
- Maximise sensitivity by permitting an appropriate exposure level for each well, by dye, rather than compromise with a universal setting



Applications

Absolute & Relative Quantitation

- Absolute quantification standard curves with efficiency calculation
- Relative quantification using the ΔΔCq method with support for multiple reference gene normalisation
- Relative gene expression with efficiency control
- Next Generation Sequencing (NGS) library quantification
- Copy Number Variation: insertions, deletions, inversions
- RNA Characterisation: siRNA and miRNA
- Viral load

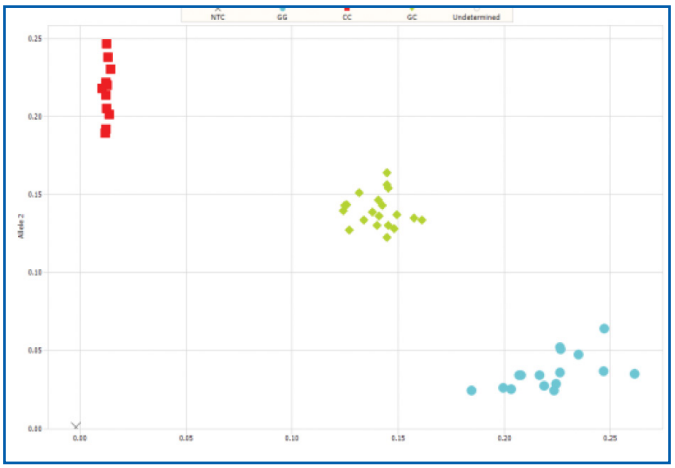
Genotyping and High resolution melting

- Allelic Discrimination
- DNA Methylation
- SNP Verification
- Microbiology: pathogen detection and identification

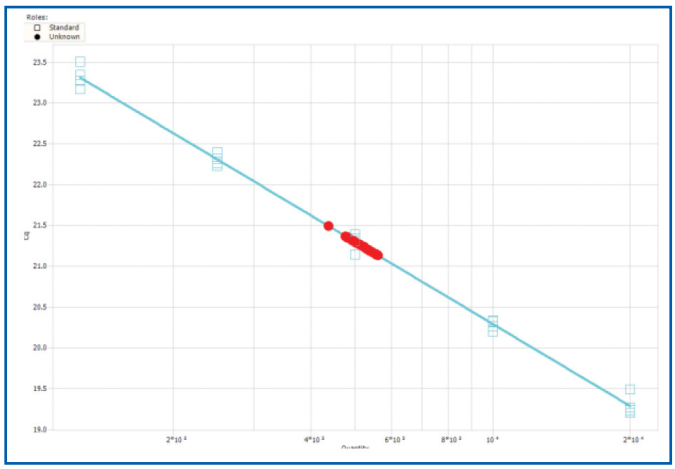
High resolution melting (HRM)

- Genotyping, methylation studies and mutation screening

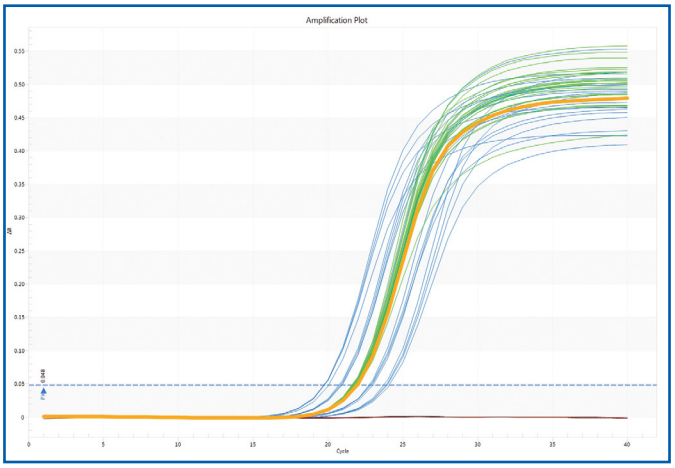
Allelic discrimination



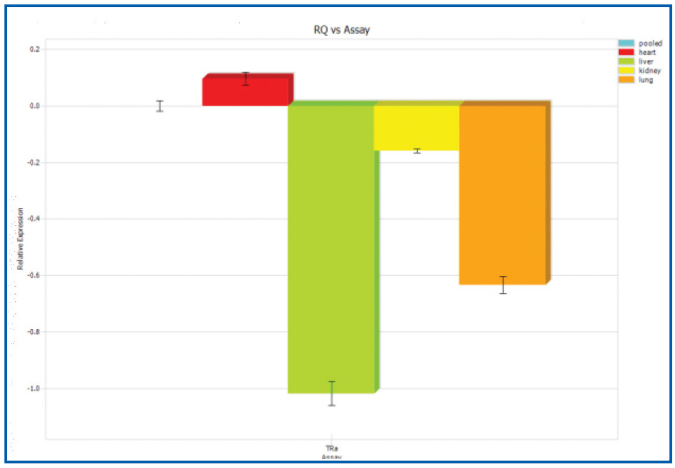
Absolute Quantification standard curve



NGS library quantification



Relative gene expression



Library quantification

- qPCR is the most precise method for quantifying libraries prior to cluster generation
- Works at concentrations below the detection threshold of conventional spectrophotometric methods

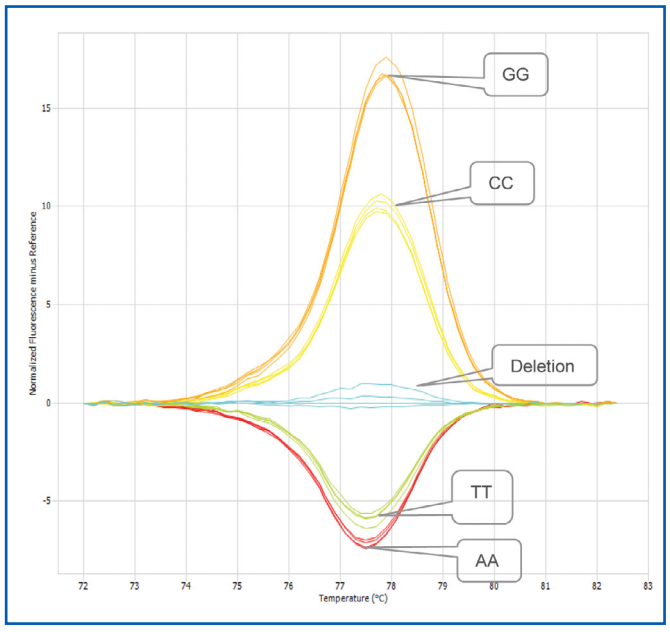
Data

- Validation of array and sequencing quality data

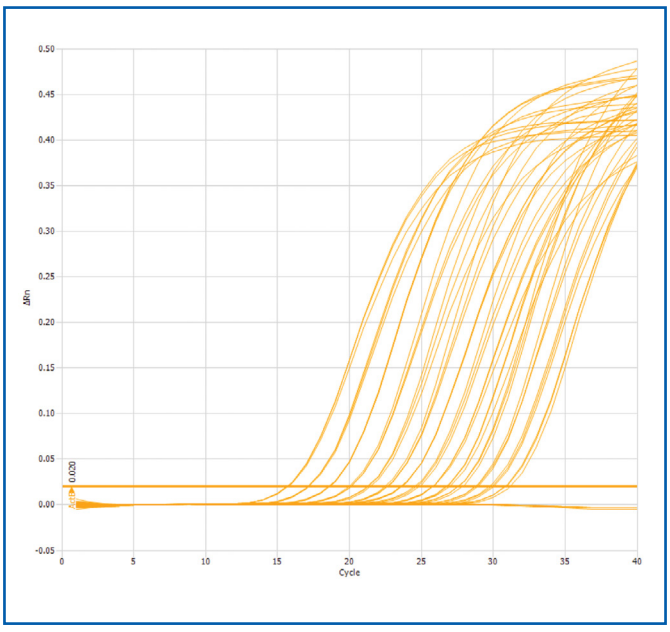
Designed for:

- Academic, Government and Corporate laboratories
- Human research, AgriGenomics, Translational, Forensics and many more markets
- Probe, DNA Binding Dye and HRM chemistries
- Gene expression, Viral detection, Sequencing Library
- Preparation, Genotyping and Mutation Screening applications
- QPCR-500 is for research use only

HRM Differential plot



Discrimination of 2-fold differences



Rapid cycling

The QPCR-500 has rapid heating and cooling rates. Average ramp rates of 5.5°C/sec reduce overall PCR run times. The typical run time for a 40 cycle PCR protocol is under 40 minutes. In testing, the quickest optimised programme enabled a 40 cycle qPCR experiment to complete in just 15 minutes.

High throughput

QPCR-500 thermal control is superior to traditional 96-well peltier systems where thermal efficiency decreases as distance from the peltier increases. With QPCR-500, faster and more precise cycling increases sample throughput because the need for multiple replicates is reduced by increased uniformity across the block. QPCR-500 well-to-well, plate-to-plate and instrument-to-instrument results are as consistent as running a single experiment. To take advantage of this, QPCR-500 has a function in the software where different experiments are reliably combined. High uniformity reduces the need for experimental replicates which saves on samples, eliminates the need for more expensive instruments, reduces reagent running costs and ensures the entire plate of data is valuable.

Speed. Confidence. Value. Sensitivity. Performance.

Results from multiple instruments can be combined together

QPCR-500 48 Wells
HIGH uniformity - Run **duplicates**

24 Samples
Run time **40 minutes**

36 Samples
per hour

±0.1°C uniformity means QPCR-500 requires fewer replicates than a conventional 96 well system.

The QPCR-500 is capable of running 40 cycles in 40 minutes.

Fewer replicates and faster cycling allows QPCR-500 to process more samples than a standard 96 well.

Conventional 96 Wells
LOW uniformity - Run **triplicates**

32 Samples
Run time **1 hour 20 minutes**

24 Samples
per hour

Software

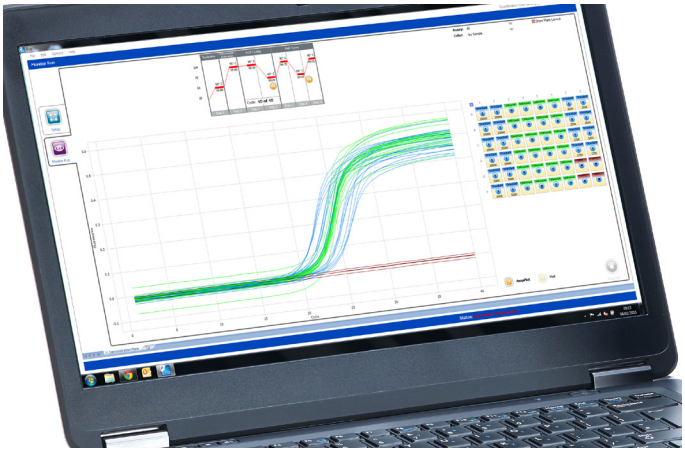
The QPCR-500 system comes with two distinct software elements. The first, Control, drives the units set up and experimental runs while Study is the analysis package. The QPCR-500 software are both open licence, you can install them on as many PCs as you like, and are MIQE compliant.

Control software

- User-installable, intuitive, easy to use software that integrates user control, real-time data collection, and advanced data analysis
- Supplied fully featured including HRM capability
- New software version 5 enables a widened chemistry library and contains new thermal profiles
- Facilitates rapid thermal cycling: 40 cycles in 40 minutes
- Supplied on a USB stick
- No need to run triplicates, to compensate for poor thermal uniformity of block

Study software

- Data analysis and Multi-Experiment Analysis
- Allows higher throughput
- Limitless sample volume
- Supplied on a USB stick



Easy-to-Use Interface

- QPCR-500 software uses a unique icon-driven user interface to simplify experimental design and setup
- Pre-set thermal profile defaults are provided for the most commonly used experimental protocols
- Temperature and time for each protocol step can easily be changed by click-and-drag action with the mouse
- Experiment templates can be customized and saved for future use

Data Analysis

- With the QPCR-500 system and software, data collection is monitored in real time, allowing researchers to access run viability immediately
- The user-friendly data analysis interface also allows researchers to easily view the amplification plot, melt curve analysis, and the analysed results, including Cq values, PCR efficiency, R^2 and Y-intercept
- Data can be exported into Excel or CSV and custom reports generated directly into PowerPoint or PDF formats
- High-resolution images can be directly exported in multiple image formats, ready to use in any presentation
- Conforms to Minimum Information for Publication of Quantitative Real-Time PCR Experiments (MIQE) guidelines, making data analysis and submission for publication review more efficient

High-Performance Results

- Due to unmatched temperature control and an optical system designed for individual well monitoring, the QPCR-500 system produces highly accurate, reliable results with PCR efficiencies between 90% and 110% and $R^2 > 0.99$ when using standard optimised assays

QPCR-500 Dock

The ergonomic plate loading dock allow for easy loading of the plate and is backlit to allow the user to easily visualise which wells have been loaded.

- Base with LED backlight
- Plate adapter fits standard centrifuge rotors
- Includes plate sealing tool

Cole-Parmer QPCR-500 Dock

What's in the box

- QPCR-500 Instrument
- Dock and Squeegee
- Control and Study software USB stick
- Plates (Pack of 50)
- Plate seals (Pack of 50)
- Power and Ethernet Cables

Ordering information

Description	Ordering Number	Model Number	Legacy Sku.
PCRmax QPCR-500 Real Time PCR System, includes Accessories and Software (Study and Control) PC not supplied	93947-00	QPCR-500	ECORT48
Pack of 50 QPCR-500 Real Time PCR Plates	99965-52	-	ECOPLATE48
Pack of 50 QPCR-500 Real Time PCR Plate seals	93947-99	-	ECOSEAL48

ZeptoMetrix® qPCR detection kits

The ZeptoMetrix qPCR kits cover the largest commercially available range of targets for any qPCR detection chemistry.

Each kit is specifically designed to ensure the broadest possible detection profile and detection of all clinically relevant strains and subtypes. All test kits are validated in-house on multiple qPCR platforms to ensure cross-platform functionality. Kits come with sufficient controls to reduce the chances of making the wrong call and a positive copy number standard to allow for easy quantification.

The range of kits cover:

- 150 tests per kit: exceptional cost per data point
- Available either with or without mastermix for added flexibility and workflow fit.
- All contents lyophilized for simple transport and storage
- Positive copy number standard curve for accurate quantification
- Rapid detection of all clinically relevant subtypes
- Highly specific detection profile with high-efficiency priming
- Broad dynamic detection range (>6 logs)
- Sensitive to <100 copies of target
- Multiple control types to simplify results
- Only two protocols for the entire range: one DNA and one RNA.

The range of kits cover:

- Human Pathogens
- Veterinary & Agricultural
- Food & Water Testing
- Speciation Kits
- Custom

All ZeptoMetrix kits are lyophilized and stable at room temperature for 18 months making shipment and storage simple.

ZeptoMetrix®

Product Details

Technical Specification

Item	QPCR-500
High Resolution Melt	Yes
Volume per well	Validated for 5 to 20µl
Detection sensitivity	1 copy
Temp uniformity	±0.1˚C
Temperature range	35 to 100˚C
Average ramp rate	5.5˚C/sec
Thermal system	Proprietary hollow silver block, Peltier-based system with conductive fluid
Block format	48-well block
Consumables	48-well custom plates and optical adhesive seals
Optical system	Dual LED excitation (452–486 nm and 542–582 nm). CCD camera 4 emission filters (505–545nm, 562–596nm, 604–644nm, 665–705nm)
Calibrated dyes	SYBR®, FAM™, HEX™, ROX™, Cy®5. Additional dyes within the wavelength range compatible with qPCR-500 filters are supported with no additional calibration required for implementation
Passive reference dyes	Use of ROX™ is supported, but optional
Data collection	Data collected in all four filters for all wells regardless of plate setup. Plate setup for data analysis can be altered after run completes. Melt curve analysis supports continuous data acquisition in a single filter to provide increased data point collection and reduced run times
PCR cycle time (standard)	40 cycles in less than 40 minutes
PCR cycle time (FAST)	40 cycles in less than 20 minutes
Dynamic range	>9 logs
Calibration	Not required
Installation	Plug and play design. Installed by experienced or novice scientists
Precision	Yes
Warranty	Discriminates 5,000 and 10,000 template copies with 99% confidence
Voltage	100–240 V
Frequency	50/60 Hz
Nominal current draw	5A
Peak power	500W (typical power is 180W)
Software	Multiple-license QPCR-500 system software is included at no additional cost. All chemistries supported. Applications include Absolute Quantification, Relative Quantification, Allelic Discrimination, High Resolution Melt (HRM)
Dimensions closed (WxDxH)	34.5cm x 31cm x 32cm (13.6 in × 12.2 in × 12.6 inches)
Dimensions open (WxDxH)	34.5cm x 31cm x 37cm (13.6 in × 12.2 in × 14.5 inches)
Weight	13.6 Kg (30 lb)

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Pricing on any accessories shown can be found by keying the part number into the search box on our website.

The specifications listed in this brochure are subject to change by the manufacturer and therefore cannot be guaranteed to be correct.
If there are aspects of the specification that must be guaranteed, please provide these to our sales team so that details can be confirmed.

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Please contact us if this literature doesn't answer all your questions.